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National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

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JSC-14807

PROGRAM DOCUMENTATION

FOR THE

DATA NOISING PROGRAM

Job Order 53-409

CPD 912

Prepared By

Lockheed Electronics Company, Inc.

Systems and Services Division

Houston, Texas

Contract NAS 9-15800

For

ENGINEERING ANALYSIS DIVISION

June 1979

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1. INTRODUCTION

The Data Noising Program (DNP) will provide a new program which simulates the effect of various noise sources on flight data. The program will read a Space Shuttle Functional Simulator (SSFS) format file, perform various noising operations on it, and rewrite a file in the SSFS format. The first noise function implemented was the time skew function, since this function determines the first and last output data record. Following implementation of the time skew function, up to six additional data noising functions may be implemented; these are noise, location, bias, alignment, quantization, and sample rate. Three of these possible six functions have been implemented at the time of this documentation, and are described herein (time skew, noise, and quantization).

The task to design, check out, and document the Data Noising Program was performed for the EX32 organization at the Johnson Space Center.

2. PROGRAM DESCRIPTION

2.1 TIME SKEW FUNCTION

2.1.1 PURPOSE

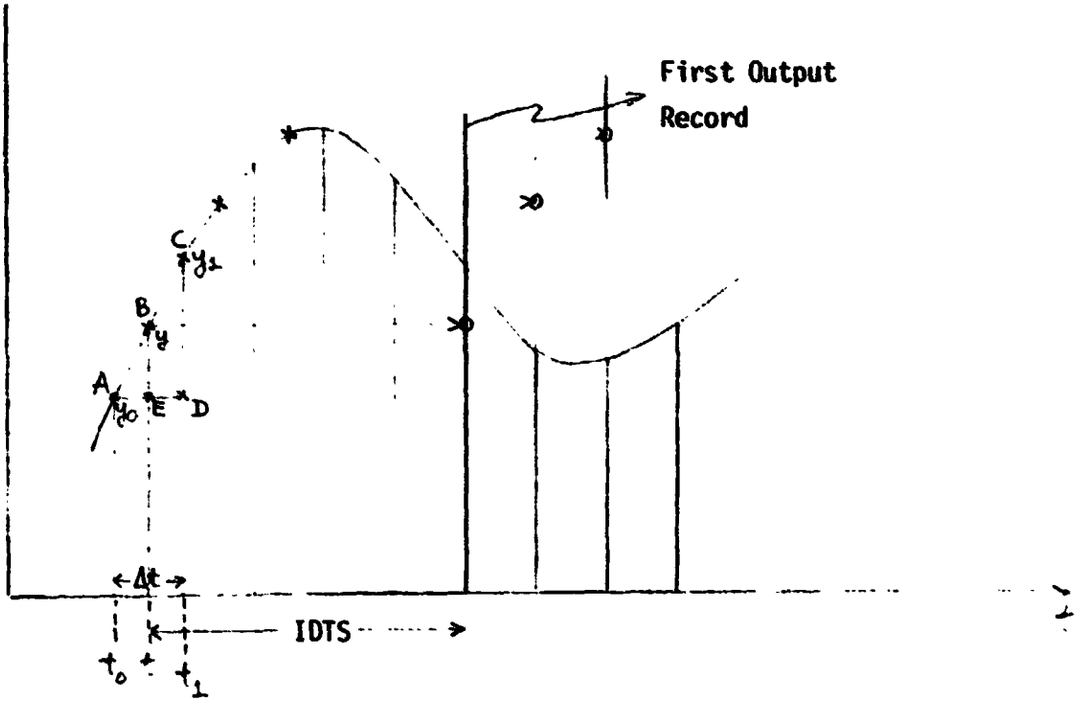
The DNP introduces a time shift, either in a positive (right) direction or negative (left) direction, for a given measurement, with respect to a normal (unskewed) measurement.

2.1.2 INPUT DATA

For a given measurement, the skew time can be input positively or negatively. However, the magnitude of skew time can not be greater than the magnitude of absolute value of 5 times the different time between two records ($\Delta\tau$) positively or negatively.

2.1.3 ANALYTICAL DESCRIPTION

a. Positive skew time



From the graph above,

$$\frac{BE}{CD} = \frac{AE}{AD}$$

Then

$$BE = \frac{AE}{AD} CD$$

$$y - y_0 = \frac{t - t_0}{\Delta t} (y_1 - y_0)$$

Therefore,

$$y = \frac{1}{\Delta t} \left[y_0(t_1 - t) + y_1(t - t_0) \right] \quad (1)$$

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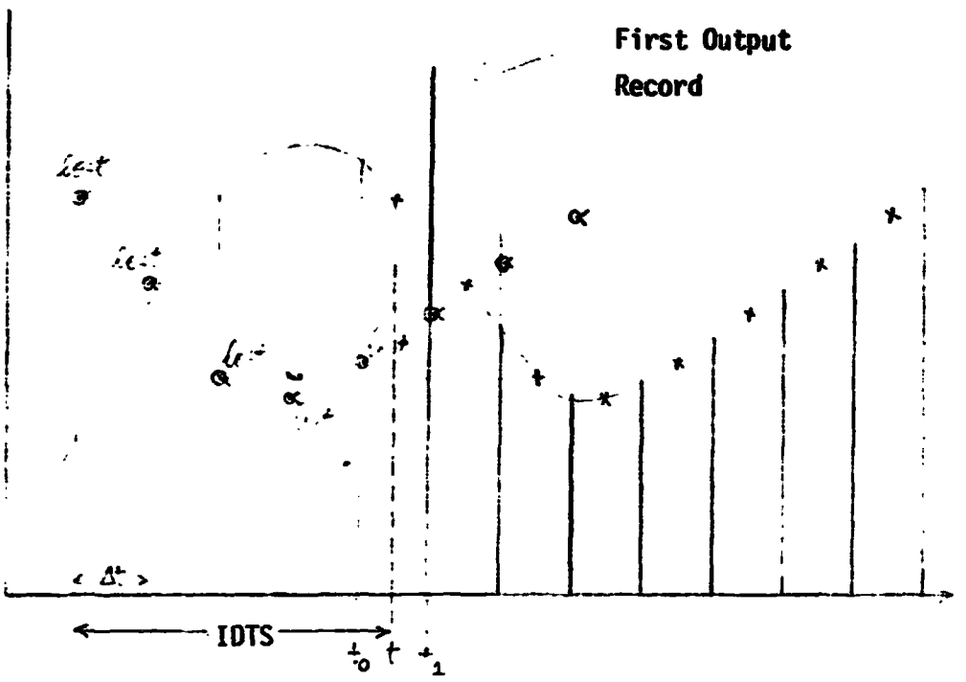
b. Negative skew time



Equation (1) is also applied for negative skew. The "lost" skew data will not be computed. Therefore, that data will not be written on the output file.

2.2 NOISE FUNCTION

2.2.1 PURPOSE

This function is used to change a measurement by adding the noise. It includes the frequency, amplitude, and phase.

2.2.2 INPUT DATA

For a given measurement, the following information must be input when the noise function is applied

a. Number of frequencies

b. For each frequency:
   Frequency in Hertz: FREQ
   Amplitude of frequency: AMPL
   Phase angle in degree: PHASE

c. Random number, which is a 5-7 digit integer where the last digit is odd: NRANDM

d. Type of random number:
   0 designates uniform
   1 designates normal: NTYPE

e. Amplitude of standard deviation: STANDN

2.2.3 ANALYTICAL DESCRIPTION

Given a measurement (whether or not it has been applied by another function) for each number of frequencies, it will be applied by the following equation:

$$Y = Y + AMPL(J) * SIN[FREQ(J) * TLOCAL + PHASE(J)]$$

where

Y = the measurement

TLOCAL = local time, which is zero from start of the output record. Time is incremented by Δt.

In the case where the input random number of this given measurement is 0, Y will be the final value after noise function is applied; otherwise, it will have the random noise added.

$$Y_1 = Y + STANDN * X$$

where

$$X = ZOR\ (NTYPE)$$

2.3 QUANTIZATION FUNCTION

2.3.1 PURPOSE

This function is used to change a measurement from a continuous form to one with discrete steps to simulate digital data.

2.3.2 INPUT DATA

For a given measurement, the following information must be input when the quantization function is applied.

a. Number of bits of quantization: IBIT

b. The upper and lower limits of range for which the measurement is to be quantized: QMAX, QMIN

2.3.3 ANALYTICAL DESCRIPTION

For a given measurement Y: if Y is less than QMIN, let Y = QMIN or if greater than QMAX, let Y = QMAX. Then Y is the final value returned from the quantization function. Otherwise, two additional parameters must be defined as follows:

a. DELTA = Number of steps into which measurement range is divided.

$$DELTA = (QMAX - QMIN)/BITS$$

where

$$BITS = FLOAT\ (2**IBIT)$$

b. INCR - Number of increments of size DELTA into which a measurement value will be divided.

$$INCR = INT\ ((Y-(QMIN + DELTA/2.))\ /DELTA\ )$$

and

$$Y_j = QMIN + FLOAT(INCR + 1) * DELTA$$

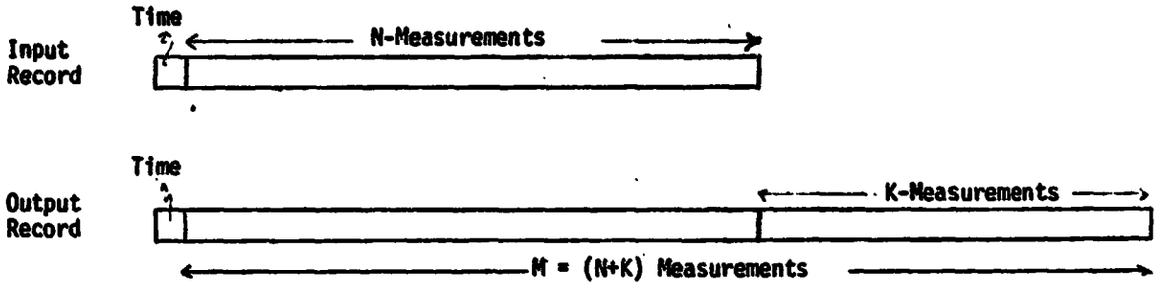
where

Y = the measurement that has been applied by another function previously, or

Y = the measurement from the input data file.

Y_j = final value after it has been quantized.

2.4 INPUT AND OUTPUT RECORDS FORMAT



Each input record consists of time and N-measurements. The output record will consist of time and M-measurements, where

$$M = N + K$$

where K is the number of measurements that are modified.

$$(1 \leq K \leq 100)$$

3. PROGRAM USAGE

The main program and its subroutine subprograms reside in the secured file EX32-L72330*DAPSPT. To execute the program, assuming that the user has assigned the input data file as well as the output data file, the user enters:

@XQT EX32-L72330*DAPSPT.RUN

The following message is displayed:

PLEASE ENTER THE INPUT AND OUTPUT LOGICAL UNITS

Key in two desired units (which must not be 5 and 6) that the user has assigned to the input and output data files. The program then will read the header record. The last word of the header record is the number of words in each subsequent record. Therefore, the following is then displayed:

THE NUMBER OF WORDS IN EACH DATA RECORD IS XXX

The program will ask for the following information on the display:

PLEASE ENTER START AND END TIME IN MILLISECOND INTEGER

The user will key in two legitimate times, and the following message will be displayed:

PLEASE ENTER CHANNEL NUMBER

The user enters any desirable channel number, and the program will then display the following function menu:

PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS

1 - SKEW	2 - NOISE
3 - LOCATION	4 - BIAS
5 - ALIGN.	6 - QUANT.
7 - SAMPLE RATE	

NOTE: Only skew, noise, and quantization are presently available.

a. If "1" is entered, the message

PLEASE ENTER SKEW TIME IN MILLISECOND INTEGER

appears on the screen, the program will always let the user know the current maximum or minimum value of skew time. The program then lists the function menu

b. If "2" is entered, the following message is displayed:

PLEASE ENTER NUMBER OF FREQUENCIES

Key in the legitimate value for number of frequencies, then the following message is displayed

PLEASE ENTER VALUES OF FREQUENCY IN HERTZ
AMPLITUDE
PHASE IN DEGREE

to request the user to enter each set of frequency, amplitude and phase. Enter one at a time. The program will convert internally input values into radians and print them out. After that, the message following is displayed:

PLEASE ENTER THE VALUES REPRESENTING THE VARIABLES AS

* RANDOM NUMBER WHERE IT IS 5-7 DIGIT INTEGER, LAST DIGIT IS ODD
* TYPE OF RANDOM WHERE 0 IS UNIFORM AND 1 IS NORMAL
* AMPLITUDE OF STANDARD DEVIATION.

Enter one set of those values; the program will print them out and return the user to the function menu:

c. If "6" is entered, the message is then displayed:

PLEASE ENTER NUMBER OF BITS

Key in the legitimate value, then the program will ask:

PLEASE ENTER THE UPPER AND LOWER LIMITS OF RANGE FOR WHICH THIS CHANNEL IS TO BE QUANTIZED.

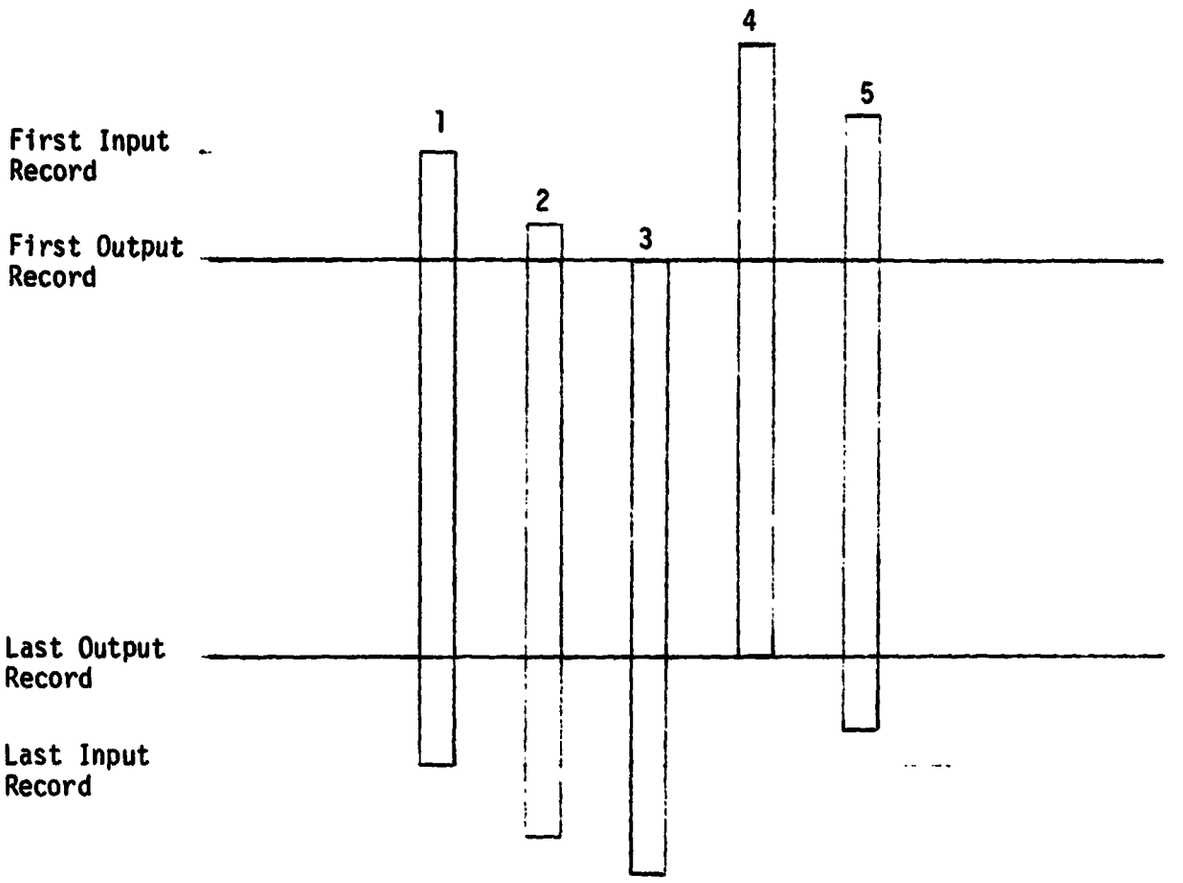
Enter two values; the program then will print them out and immediately return the user to the function menu.

In order to get out the function menu, the user simply enters "0", the program will ask for another channel number. However, if "0" is entered when the program requests the channel number, the program will then display the message:

TOTAL NUMBERS OF CHANNEL ARE XXX

From this point on, the output records are printed. Each output record consists of the number of channels in each input record and the total number of modified channels.

4. DIAGRAM



Because the time skew function dictates the outcome of the output records, the above chart shows how the output file looks, depending upon the input skew time. Five possible cases may occur:

1 - No skew time

2 - Input positive skew time is less than maximum positive skew time

3 - Maximum positive skew time

4 - Maximum negative skew time

5 - Magnitude of the absolute value of input negative skew time is less than magnitude of the absolute value of maximum negative.

APPENDIX A

FORTRAN SOURCE LISTING

```
@FOR,S DAPSPT.NOISNG/LEG
FOR 90E3-06/13/79-12:43:1?  1..

   MAIN PROGRAM

   STORAGE USED: CODE(1) 001736; [+TA-E  000644); BLANK COMMON(2) 000000

    COMMON BLOCKS:

     0003    ARRAY   004230
     0004    HERTZ   000764
     0005    DISTC   000764
     0006    DEGRE   000764
     0007    TIMEX   000144


   EXTERNAL REFERENCES (BLOCK, NAME)

     0010    CONVER
     0011    RANDOM
     0012    SKEW
     0013    NOISE
     0014    QUANTN
     0015    NINTR$
     0016    NWDU$
     0017    NIO2$
     0020    NRDU$
     0021    NREW$
     0022    NRBU$
     0023    NIO3$
     0024    NERR2$
     0025    NSTOP$
     0026    NWBU$
     0027    NIO1$


   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001    001627 1L       0001    000164 10L      0001    000134 100L     0001    00:605 1000L    0001    001613 1010L
     0001    000330 1020L    0001    000260 1030L    0001    000432 1050L    0001    000336 1051L    0001    001644 1055L
     0001    000516 1210L    0001    001666 19EL     0001    001674 197L     0001    000002 199L     0001    000620 2L
     0001    00v165 20L      0001    000321 2000L    0001    001702 201L     0001    001710 202L     0001    000237 210G
     0001    000256 224G     0001    000377 23L      0001    001007 27L      0001    001376 310L     0001    001364 311L
     0001    001247 320L     0001    001346 321L     0001    001331 330L     0001    001307 331L     0001    001313 332L
     0001    001336 334L     0001    000545 400L     0001    000552 405L     0001    000674 410G     0001    000565 410L
     0001    001201 415L     0001    001205 420L     0001    000716 424G     0001    001636 43L      0001    001652 49L
     0001    000563 5L       0000    002371 500F     0001    001621 501L     0001    001165 552G     0001    001214 566G
     0001    001067 570L     0001    001226 574G     0001    001113 575L     0001    001121 580L     0001    001126 585L
     0000    002372 600F     0000    003235 608F     0000    003261 609F     0000    003305 6115F    0000    002710 6123F
     0000    00240  615F     0000    003122 619F     0000    002416 620F     0000    003137 621F     0000    003160 6222F
     0000    003170 6233F    0000    002433 625F     0000    002440 630F     0000    002455 632F     0000    002465 635F
     0000    002545 640F     0001    001422 643G     0000    002637 652F     0001    001434 652G     0000    002577 655F
     0000    003050 6555F    0000    003061 660F     0000    003071 665F     0000    003057 6677F    0000    003101 670F
     0001    001475 671G     0000    003004 6710F    0000    003110 672F     0000    003011 6720F    0000    002032 6730F
     0000    002566 676F     0000    002555 677F     0000    002530 691F     0000    002361 6990F    0000    003211 6991F
     0000    003223 6993F    0001    001527 703G     0001    001536 707G     0001    001575 725G     0001    001716 745L
     0001    001134 749L     0001    001045 750L     0001    001505 777L     0001    001560 79L      0000    002661 850F
     0000    002667 851F     0000    002723 852F     0000    002771 857F     0001    000765 9L       0005 R  000000 AMPL
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```
0000 R 002331 DTR       0004 R 000000 FREQ      0000 I 002275 I         0000 I 001446 IBIT      0000 I 002333 IBITS
0000 I 002342 IBUF      0000 I 002344 ICALL     0000 I 002316 ICHAN     0000 I 002343 ICLT      0000 I 002303 IDT
0000 I 002321 IDTS      0000 I 002350 IDTSAB    0000 I 002324 IDTSAS    0000 I 002347 IDTS+1    0000 I 002313 IDTSMN
0000 I 002314 IDTSMX    0000 I 000000 IDUM      0000 I 003323 IDUMMY    0000 I 002300 IET       0000 I 003323 IFCNTB
0000 I 002320 IFCNUM    0000 I 002352 IFIRST    0000 I 002317 IFUNC     0000 I 002274 IK        0000 I 002354 IMN
0000 I 000626 INSKEW    0000 I 002337 IRFOUT    0000 I 002340 IRLOUT    0000 I 002322 ISKEW     0000 I 002277 IST
0000 I 002305 ISTREC    0000 I 002336 ISUM      0000 I 002302 ITM       0000 I 002304 ITOTAL    0000 I 002346 ITYPE
0000 I 002272 IUNT      0000 I 002345 J         0000 I 002273 JUNT      0000 I 002360 K         0000 I 002355 KK
0000 I 002306 KOUNT     0000 I 002311 MAXDEL    0000 I 002312 MINDEL    0000 I 002315 NC        0000 I 002323 NCAP
0000 I 002310 NEGIDT    0000 L 002267 NEGSKW    0000 I 002341 NGOTO     0000 I 002351 NLOCAL    0000 I 002327 NMFREQ
0000 I 002307 NMOTRC    0000 I 002356 NMOVE     0000 I 002325 NMXNEG    0000 I 002353 NN        0000 I 002772 NRANDM
0000 I 002357 NSTOP     0000 I 001136 NTYPE     0000 I 002122 NUMFRE    0000 I 002301 NUMREC    0000 I 002276 NWORD
0000 I 002326 NWORK     0006 R 000000 PHASE     0000 L 002270 POSSKW    0000 R 001612 QMAX      0000 R 002334 QMAXX
0000 R 001756 QMIN      0000 R 002335 QMINN     0011 R 000000 RANDOM    0000 R 000400 RECORD    0000 L 002266 SKWFLG
0000 R 001302 STANDN    0007   000000 TLOCAL    0000 R 002330 TWOPIE    0003 R 000000 WORK      0000 R 002271 XEND
0000 R 002332 Z1
```

```
00100      1*      C
00100      2*      C
00100      3*      C                PROGRAM NAME    -    DATA NOISING PROGRAM
00100      4*      C
00100      5*      C              DEPT.      -      APPLIED MECHANICS
00100      6*      C              SECT.      -      DATA MANAGEMENT
00100      7*      C              DATE       -      NOVEMBER  1978
00100      8*      C              AUTHOR     -      M.T. NGUYEN
00100      9*      C
00100     10*      C
00100     11*      C
00100     12*      C        FOR EX43-ENGINEERING ANALYSIS DIVISION AT NASA/JSC
00100     13*      C
00100     14*      C
00100     15*      C        PURPOSE :
00100     16*      C
00100     17*      C
00100     18*      C           THE DATA NOISING PROGRAM WILL PROVIDE A NEW PROGRAM WHICH
00100     19*      C           SIMULATES THE EFFECT OF VARIOUS NOISE SOURCES ON DATA.
00100     20*      C           THE PROGRAM WILL READ A SPACE SHUTTLE FUNCTIONAL SIMULATOR
00100     21*      C           (SSFS) FORMAT FILE, PERFORM VARIOUS NOISING OPERATIONS
00100     22*      C           ON IT, AND REWRITE A FILE IN THE SSFS FORMAT.
00100     23*      C
00100     24*      C           THE FIRST AND NECESSARY NOISE FUNCTION TO BE IMPLEMENTED
00100     25*      C           IS THE TIME-SKEW FUNCTION. FOLLOWING IMPLEMENTATION OF
00100     26*      C           THE TIME-SKEW FUNCTION, UP TO SIX ADDITIONAL DATA
00100     27*      C           NOISING FUNCTIONS ARE TO BE IMPLEMENTED. THEY ARE LISTED
00100     28*      C           AS FOLLOWS : NOISE, LOCATION, BIAS, ALIGNMENT, QUANTATIZATION
00100     29*      C           AND SAMPLE RATE.
00100     30*      C
00100     31*      C
00101     32*            PARAMETER IDTMIN=20,IDTSMA=5*IDTMIN
00103     33*            PARAMETER NWORK1=2*IDTSMA/IDTMIN+1
00104     34*            COMMON /ARRAY/ WORK(NWORK1,200)
00105     35*            COMMON /HERTZ/ FREQ(100,5)
00106     36*            COMMON /DISTC/ AMPL(100,5)
00107     37*            COMMON /DEGRE/ PHASE(100,5)
00110     38*            COMMON /TIMEX/ TLOCAL(100)
```

```
00111     39*          DIMENSION IDUM(256),RECORD(150),IDUMMY(1),INSKEW(100)                  000002
00112     40*          DIMENSION IFCNTB(100,8),NRANDM(100),NTYPE(100),STANDN(100)             000002
00113     41*          DIMENSION IBIT(100),QMAX(100),QMIN(100),NUMREC(100)                    000002
00114     42*          LOGICAL SKWFLG,NEGSKW,POSSKW                                           000002
00115     43*          EQUIVALENCE (IDUMMY(1),IFCNTB(1,1))                                    000002
00116     44*          DATA XEND /3HEOF/                                                      000002
00116     45*     C                                                                           000002
00116     46*     C  ***  INPUT LOGICAL UNIT - IUNT                                         000002
00116     47*     C  *** OUTPUT LOGICAL UNIT - JUNT                                         000002
00116     48*     C                                                                           000002
00120     49*       199 WRITE(6,6990)                                                       000002
00122     50*      6990 FORMAT(1X,'ENTER THE INPUT & OUTPUT LOGICAL UNITS')                 000006
00123     51*           READ(5,500) IUNT,JUNT                                              000006
00127     52*       500 FORMAT( )                                                          000015
00127     53*     C                                                                           000015
00130     54*           IF(IUNT .LT. 1  .OR.  IUNT .EQ. 5  .OR.  IUNT .EQ. 6  .OR.  IUNT .  000015
00130     55*          *GT. 30) GO TO 196                                                  000015
00132     56*           IF(JUNT .LT. 1  .OR.  JUNT .EQ. 5  .OR.  JUNT .EQ. 6  .OR.  IUNT .  000047
00132     57*          *GT. 30) GO TO 197                                                  000047
00132     58*     C                                                                           000047
00132     59*     C  ***  INITIALIZE THE LOGICAL FLAGS  ***                                 000047
00132     60*     C                                                                           000047
00134     61*           SKWFLG = .FALSE.                                                    000101
00136     62*           POSSKW = .FALSE.                                                    000102
00136     63*           NEGSKW = .FALSE.                                                    000103
00137     64*           IK = 0                                                              000104
00137     65*     C                                                                           000104
00137     66*     C   ***  REWIND BOTH INPUT & OUTPUT DATA FILES  ***                       000104
00137     67*     C                                                                           000104
00140     68*           REWIND IUNT                                                         000105
00141     69*           REWIND JUNT                                                         000110
00141     70*     C                                                                           000110
00141     71*     C  ***  READ HEADER RECORD (256 WORDS)  ***                              000110
00141     72*     C  ***  DETERMINE NUMBER OF POINTS IN EACH DATA RECORD ***               000110
00141     73*     C                                                                           000110
00142     74*           READ(IUNT,ERR=501)(IDUM(I),I=1,256)                                 000113
00145     75*           NWORD = IDUM(256)                                                   000123
00146     76*           WRITE(6,600) NWORD                                                  000125
00151     77*       600 FORMAT(1X,'THE NUMBER OF POINTS IN EACH DATA RECORD ARE',I5)        000134
00151     78*     C                                                                           000134
00151     79*     C  ***  USER(S) INPUT START AND END TIMES  ***                           000134
00151     80*     C                                                                           000134
00152     81*       100 WRITE(6,615)                                                        000134
00154     82*       615 FORMAT(1X,'ENTER START AND END TIME IN MILLISECOND INTEGER')       000140
00155     83*           READ(5,500) IST,IET                                                 000140
00155     84*     C                                                                           000140
00161     85*           IF(IST .EQ. 0) GO TO 1000                                           000147
00163     86*           IF(IET .GT. IST) GO TO 10                                           000151
00165     87*           WRITE(6,620)                                                        000155
00167     88*       620 FORMAT(1X,'ERROR - TRY AGAIN',/                                     000162
00167     89*          *,1X,'END TIME HAS TO BE GREATER THAN START TIME')                   000162
00170     90*           GO TO 100                                                           000162
00170     91*     C                                                                           000162
00170     92*     C  ***  LOOKING FOR START TIME  ***                                      000162
00170     93*     C                                                                           000162
00171     94*       10 NUMREC = 0                                                           000164
00171     95*     C                                                                           000164
00171     96*     C  ***  ROUTINE CONVER IS DEPICTED FROM EX43-N04482*BIGFILE  ***        000164
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00171     97*     C  ***  ITS ORIGINAL NAME IS SSFSR  ***                                  000164
00171     98*     C                                                                       000164
00172     99*        20 CALL CONVER(IUNT,NWORD,ITM,IDT,RECORD,IK)                         000165
00173    100*           IF(IST .LT. ITM) GO TO 43                                         000174
00175    101*           IF(IK .EQ. 1) GO TO 1010                                          000200
00177    102*           NUMREC = NUMREC + 1                                               000205
00177    103*     C                                                                       000205
00177    104*     C  *** DETERMINE THE TOTAL RECORDS NEEDED IN THE PROGRAM  ***           000205
00177    105*     C                                                                       000205
00200    106*           IF(NUMREC .EQ. 2) ITOTAL = (IET-IST)/IDT + 1                      000211
00202    107*           IF(ITM .LT. IST) GO TO 20                                         000222
00202    108*     C                                                                       000222
00202    109*     C  ***  START TIME HAS BEEN FOUND  ***                                 000222
00202    110*     C                                                                       000222
00204    111*           IST = ITM                                                         000226
00205    112*           ISTREC = 1                                                        000230
00206    113*           KOUNT = 1                                                         000232
00206    114*     C                                                                       000232
00206    115*     C  ***  STORE THE FIRST RECORD IN THE WORK - ARRAY  ***                000232
00206    116*     C                                                                       000232
00207    117*           DO 11 I=1,NWORD                                                   000237
00212    118*        11 WORK(1,I) = RECORD(I)                                             000237
00212    119*     C                                                                       000237
00212    120*     C  ***  INITIALIZATION  ***                                           000237
00212    121*     C                                                                       000237
00214    122*           NNOTRC = 1                                                        000241
00215    123*           NEGIDT = - IDT                                                    000243
00216    124*           MAXDEL = 5*IDT                                                    000245
00217    125*           MINDEL = - MAXDEL                                                 000247
00220    126*           IDTSMN = 0                                                        000250
00221    127*           IDTSMX = 0                                                        000251
00222    128*           NC = 0                                                            000252
00223    129*           DO 13 I=1,800                                                     000256
00226    130*        13 IDUMMY(I) = 0                                                     000256
00226    131*     C                                                                       000256
00226    132*     C  ***  USER INPUT CHANNEL NUMBER TO BE MODIFIED  ***                  000256
00226    133*     C                                                                       000256
00230    134*      1030 WRITE(6,625)                                                      000260
00232    135*       625 FORMAT(1X,'ENTER CHANNEL NUMBER')                                 000264
00233    136*           READ(5,500) ICHAN                                                 000264
00233    137*     C                                                                       000264
00233    138*     C  ***  TESTING USER'S INPUT OF CHANNEL NUMBER                         000264
00233    139*     C                                                                       000264
00236    140*           IF(ICHAN .EQ. 0) GO TO 2000                                       000272
00240    141*           IF(ICHAN .GT. 1 .AND. ICHAN .LE. NWORD) GO TO 1020                000274
00242    142*           WRITE(6,630)                                                      000312
00244    143*        630 FORMAT(1X,'ERROR - TRY AGAIN',/                                  000317
00244    144*          *,1X,'YOU HAVE INPUT AN INVALID CHANNEL NUMBER')                   000317
00245    145*           GO TO 1030                                                        000317
00245    146*     C                                                                       000317
00246    147*      2000 WRITE(6,632) NC                                                   000321
00251    148*       632 FORMAT(//25X,'NUMBER OF MODIFIED CHANNELS ARE',I5)                000326
00252    149*           GO TO 750                                                         000326
00252    150*     C                                                                       000326
00252    151*     C  *** INCREMENT NUMBER OF CHANNEL BY 1 ***                           000326
00252    152*     C  ***  THEN STORE IT IN THE FUNCTION TABLE  ***                       000326
00252    153*     C                                                                       000326
00253    154*      1020 NC = NC + 1                                                       000330
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00254    155*          IFCNTB(NC,1) = ICHAN                                                    000333
00254    156*     C                                                                            000333
00254    157*     C  ***  DISPLAY THE FUNCTION MENU  ***                                      000333
00254    158*     C                                                                            000333
00255    159*      1051 WRITE(6,635)                                                           000336
00257    160*       635 FORMAT(/,1X,'ENTER THE NUMERICAL VALUE REPRESENTING THE FOL           000342
00257    161*          *LOWING FUNCTIONS',/,10X,'1-SKEW ',10X,'2-NOISE ',/                    000342
00257    162*          *,10X,'3-LOCATION ',6X,'4-BIAS',/,10X,'5-ALIGN.',8X,'6-QUANT. ',/      000342
00257    163*          *,18X,'7-SAMPLE RATE'/)                                                000342
00257    164*     C                                                                            000342
00257    165*     C  ***  READ THE FUNCTION NUMBER ***                                       000342
00257    166*     C                                                                            000342
00260    167*          READ(5,500) IFUNC                                                       000342
00263    168*          IF(IFUNC .EQ. 0) GO TO 1030                                             000350
00265    169*          IF(IFUNC .GE. 1 .AND. IFUNC .LE. 7) GO TO 23                            000352
00265    170*     C                                                                            000352
00267    171*          WRITE(6,691)                                                            000370
00271    172*        691 FORMAT(1X,'ERROR - TRY AGAIN',/                                       000375
00271    173*          *,' YOU HAVE INPUT AN INVALID FUNCTION NUMBER')                         000375
00272    174*          GO TO 1051                                                              000375
00273    175*         23 CONTINUE                                                              000377
00273    176*     C                                                                            000377
00273    177*     C   ***  TURN ON THE SKEW FLAG  ***                                        000377
00273    178*     C                                                                            000377
00274    179*          IF (IFUNC .EQ. 1) SKWFLG = .TRUE.                                       000377
00274    180*     C                                                                            000377
00274    181*     C  ***  BUILDING THE FUNCTION TABLE  ***                                   000377
00274    182*     C                                                                            000377
00276    183*          IFCNUM = IFUNC + 1                                                      000403
00276    184*     C                                                                            000403
00276    185*     C  ***  TEST IF THAT FUNCTION HAS BEEN INPUT  ***                          000403
00276    186*     C                                                                            000403
00277    187*          IF(IFCNTB(NC,IFCNUM) .GT. 0) GO TO 1055                                 000410
00301    188*          IFCNTB(NC,IFCNUM) = IFUNC                                               000413
00301    189*     C                                                                            000413
00301    190*     C  ***  INPUT DATA RELATED TO FUNCTION(S)  ***                             000413
00301    191*     C                                                                            000413
00302    192*          GO TO (1050,2,1,1,1,9,1),IFUNC                                          000415
00302    193*     C                                                                            000415
00302    194*     C  ***  INPUT DATA RELATED TO FUNCTION SKEW  ***                           000415
00302    195*     C                                                                            000415
00303    196*      1050 WRITE(6,640)                                                           000432
00305    197*       640 FORMAT(1X,'ENTER SKEW TIME IN MILLISECOND INTEGER')                   000436
00306    198*          READ(5,500) IDTS                                                        000436
00306    199*     C                                                                            000436
00306    200*     C  ***  CHECKING THE USER'S INPUT OF SKEW TIME  ***                        000436
00306    201*     C                                                                            000436
00311    202*          IF(IDTS .GT. MAXDEL) GO TO 201                                          000445
00313    203*          IF(IDTS .LT. MINDEL) GO TO 202                                          000451
00313    204*     C                                                                            000451
00313    205*     C   ***  TURN ON THE NEGATIVE SKEW FLAG  ***                               000451
00313    206*     C                                                                            000451
00315    207*          IF(IDTS .LT. 0) NEGSKW = .TRUE.                                         000456
00315    208*     C                                                                            000456
00315    209*     C   ***  TURN ON THE POSITIVE SKEW FLAG  ***                               000456
00315    210*     C                                                                            000456
00317    211*          IF(IDTS .GT. 0) POSSKW = .TRUE.                                         000463
00317    212*     C                                                                            000463
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00317    213*     C  ***  STORE THE INPUT SKEW TIME IN THE ARRAY  ***                                  000463
00317    214*     C                                                                                   000463
00321    215*      1200 CONTINUE                                                                      000470
00322    216*           INSKEW(NC) = IDTS                                                             000470
00323    217*           ISKEW = IABS(INSKEW(NC))                                                      000473
00324    218*           IF(INSKEW(NC) .GT. 0) GO TO 1210                                              000475
00324    219*     C                                                                                   000475
00324    220*     C    ***  DETERMINE THE CURRENT MINIMUM VALUE OF SKEW TIME  ***                     000475
00324    221*     C                                                                                   000475
00326    222*           IF(INSKEW(NC) .LT. IDTSMN) IDTSMN = IDTS                                      000475
00330    223*           WRITE(6,677) IDTSMN                                                           000500
00333    224*       677 FORMAT(1X,'CURRENT MINIMUM VALUE OF SKEW TIME IS ',I5/)                       000507
00333    225*     C                                                                                   000516
00333    226*     C  ***  DETERMINE THE CURRENT MAXIMUM VALUE OF SKEW TIME  ***                       000516
00333    227*     C                                                                                   000516
00334    228*      1210 IF(ISKEW .GT. IDTSMX) IDTSMX = ISKEW                                          000516
00336    229*           WRITE(6,676) IDTSMX                                                           000516
00341    230*       676 FORMAT(1X,'CURRENT MAXIMUM VALUE OF SKEW TIME IS ',I5/)                       000523
00341    231*     C                                                                                   000531
00341    232*     C  ***  DETERMINE NUMBER OF RECORDS NEEDED TO BE READ  ***                         000531
00341    233*     C                                                                                   000531
00342    234*           IF(MOD(IDTSMX,IDT) .GT. 0) GO TO 400                                          000531
00344    235*           NCAP = IDTSMX/IDT + 1                                                         000531
00345    236*           GO TO 405                                                                     000536
00345    237*     C                                                                                   000543
00346    238*       400 NCAP = IDTSMX/IDT + 2                                                         000543
00347    239*       405 IF(NCAP .LE. ITOTAL) GO TO 410                                              000545
00351    240*           WRITE(6,655)                                                                  000552
00353    241*       655 FORMAT(1X,'ERROR - YOU HAVE MADE A CRITICAL MISTAKE'/                        000555
00353    242*          *1X,'THE TOTAL NUMBER OF RECORDS DICTATED BY START AND END'/                  000563
00353    243*          *1X,'TIMES SHOULD BE GREATER THAN THE NUMBER OF STARTING'/                    000563
00353    244*          *1X,'OUTPUT RECORD')                                                          000563
00354    245*           STOP                                                                          000563
00354    246*     C                                                                                   000563
00354    247*     C  ***  DETERMINE THE TOTAL NUMBER OF RECORDS ( NWORK ) NEEDED  ***                000563
00354    248*     C  ***          IN THE WORKING ARRAY             ***                                000563
00354    249*     C                                                                                   000563
00355    250*       410 CONTINUE                                                                      000563
00356    251*           IDTSAS = IABS(IDTSMN)                                                         000565
00357    252*           NMXNEG = IDTSAS/IDT + 1                                                       000565
00360    253*           IF(MOD(IDTSAS,IDT) .GT. 0) NMXNEG = NMXNEG + 1                                000566
00362    254*           NWORK = NCAP + NMXNEG - 1                                                     000572
00363    255*           IF(NWORK .LT. ITOTAL) GO TO 1051                                              000602
00365    256*           WRITE(6,652)                                                                  000606
00367    257*       652 FORMAT(1X,'ERROR - YOU HAVE MADE A CRITICAL MISTAKE'/                        000611
00367    258*          *1X,'WE CANNOT FIND THE RECORD NEEDED FOR OUTPUTTING')                        000616
00370    259*           GO TO 5                                                                       000616
00370    260*     C                                                                                   000616
00370    261*     C  ***  INPUT DATA RELATED TO FUNCTION NOISE  ***                                   000616
00370    262*     C                                                                                   000616
00371    263*         2 WRITE(6,850)                                                                  000616
00373    264*       850 FORMAT(1X,'ENTER NUMBER OF FREQUENCIES')                                      000620
00374    265*           READ(5,500) NMFREQ                                                            000624
00374    266*     C                                                                                   000624
00377    267*           IF(NMFREQ .LE. 0  .OR.  NMFREQ .GT. 5) GO TO 745                              000624
00401    268*           NUMFRE(NC) = NMFREQ                                                           000636
00402    269*           TWOPIE = 6.2831853                                                            000653
00403    270*           DTR = .01745329                                                               000656
                                                                                                     000660
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00483    271*     C
00483    272*     C  ***  INPUT FREQUENCIES, AMPLITUDES AND PHASES  ***
00483    273*     C
00484    274*           WRITE(6,851)
00486    275*       851 FORMAT(1X,'ENTER VALUES OF FREQUENCY IN HERTZ',/
00486    276*          *,24X,'AMPLITUDE                ',/
00486    277*          *,24X,'PHASE IN DEGREE')
00486    278*     C
00487    279*           DO 4 I = 1,NMFREQ
00512    280*           READ(5,500) FREQ(NC,I),AMPL(NC,I),PHASE(NC,I)
00517    281*           FREQ(NC,I) = FREQ(NC,I)*TWOPIE
00520    282*           PHASE(NC,I) = PHASE(NC,I)*DTR
00521    283*         4 CONTINUE
00521    284*     C
00523    285*           DO 3 I=1,NMFREQ
00526    286*           WRITE(6,6123) FREQ(NC,I),AMPL(NC,I),PHASE(NC,I)
00533    287*      6123 FORMAT(5X,'FREQUENCY',F15.5,5X,'AMPLITUDE',F15.5,5X,'PHASE',F15.5)
00534    288*         3 CONTINUE
00534    289*     C
00534    290*     C  ***  INPUT RANDOM NUMBER, TYPE OF RANDOM AND STANDARD DEVIATION  ***
00534    291*     C
00536    292*           WRITE(6,852)
00540    293*       852 FORMAT(1X,'ENTER THE VALUES REPRESENTING THE VARIABLES AS'/
00540    294*          *,10X,'RANDOM NUMBER WHERE IT IS 5-7 DIGIT INTEGER, LAST DIGIT IS 0
00540    295*          *DD',/,10X,'TYPE OF RANDOM WHERE 0 IS UNIFORM AND 1 IS NORMAL'/
00540    296*          *,10X,'AMPLITUDE OF STANDARD DEVIATION')
00540    297*     C
00541    298*           READ(5,500) NRANDM(NC),NTYPE(NC),STANDN(NC)
00546    299*           IF(NRANDM(NC) .LE. 0) GO TO 1051
00550    300*           Z1 = RANDOM(NRANDM(NC))
00550    301*     C
00551    302*           WRITE(6,857) NRANDM(NC),NTYPE(NC),STANDN(NC)
00556    303*       857 FORMAT(/1X,'RANDOM NUMBER',I8,2X,'TYPE',I2,'  STNDRD DEV.',F10.5/)
00557    304*           GO TO 1051
00557    305*     C
00557    306*     C   ***  INPUT DATA RELATED TO FUNCTION QUANTATIZATION  ***
00557    307*     C
00560    308*         9 WRITE(6,6710)
00562    309*      6710 FORMAT(1X,'ENTER NUMBER OF BITS')
00563    310*           READ(5,500) IBITS
00566    311*           IF(IBITS .LE. 0) GO TO 49
00570    312*           IBIT(NC) = IBITS
00570    313*     C
00571    314*        27 WRITE(6,6720)
00573    315*      6720 FORMAT(1X,'ENTER THE UPPER & LOWER LIMITS OF RANGE',/
00573    316*          *,1X,'FOR WHICH THIS CHANNEL IS TO BE QUANTATIZED')
00573    317*     C
00574    318*           READ(5,500) QMAXX,QMINN
00500    319*           IF(QMAXX .LE. QMINN) GO TO 79
00502    320*           QMAX(NC) = QMAXX
00503    321*           QMIN(NC) = QMINN
00503    322*     C
00504    323*           WRITE(6,6730) IBIT(NC),QMAX(NC),QMIN(NC)
00511    324*      6730 FORMAT(/10X,'NUMBER OF BITS',I3,5X,'MAX. NUMBER',F15.5,5X,
00511    325*          *'MIN. NUMBER',F15.5/)
00512    326*           GO TO 1051
00512    327*     C
00512    328*     C  ***  START PROCESSING THE DATA NOISNG PROGRAM  ***
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00512   329*      C
                    750 ISUM = NWORD + N                                                    001043
00513   330*                                                                                001045
00513   331*      C
00513   332*      C  ***  STORE IN THE 256TH WORD OF HEADER RECORD  ***                     001045
00513   333*      C                                                                         001045
00514   334*                                                                                001047
00514   335*      C                                                                         001047
00514   336*      C  ***  WRITE ON THE OUTPUT TAPE THE HEADER RECORD  ***                  001047
00514   337*      C                                                                         001047
00515   338*                                                                                001050
00520   339*                                                                                001057
00520   340*      C                                                                         001057
00520   341*      C  ***  IRFOUT : INPUT RECORD FIRST OUTPUT  ***                          001057
00520   342*      C  ***  IRLOUT : INPUT RECORD LAST  OUTPUT  ***                          001057
00520   343*      C                                                                         001057
00520   344*      C  ***  DETERMINE THE BEGINNING AND ENDING OF OUTPUT RECORDS  ***        001057
00520   345*      C                                                                         001057
00520   346*      C  ***  SKEW FLAG HAS NOT BEEN TURNED ON AT ALL  ***                     001057
00520   347*      C                                                                         001057
00522   348*                                                                                001061
00523   349*                                                                                001063
00524   350*                                                                                001065
00525   351*                  570 NGOTO = 1                                                 001067
00526   352*                                                                                001070
00530   353*                                                                                001075
00532   354*                                                                                001102
00532   355*      C                                                                         001102
00532   356*      C  ***  BOTH POSITIVE AND NEGATIVE FLAGS ARE TURNED ON  ***             001102
00532   357*      C                                                                         001102
00533   358*                  575 IRFOUT = NCAP                                             001113
00534   359*                                                                                001114
00535   360*                                                                                001117
00535   361*      C                                                                         001117
00535   362*      C  ***  ONLY POSITIVE FLAG IS TURNED ON  ***                            001117
00535   363*      C                                                                         001117
00536   364*                  580 IRFOUT = NCAP                                             001121
00537   365*                                                                                001122
00540   366*                                                                                001124
00540   367*      C                                                                         001124
00540   368*      C  ***  ONLY NEGATIVE FLAG IS TURNED ON  ***                            001124
00540   369*      C                                                                         001124
00541   370*                  585 IRFOUT = 1                                                001126
00542   371*                                                                                001127
00542   372*      C                                                                         001127
00542   373*      C  ***  READ MORE DATA RECORD FROM INPUT DATA FILE  ***                  001127
00542   374*      C                                                                         001127
00543   375*                  749 CALL CONVER(IUNT,NWORD,ITM,IDT,RECORD,IK)                 001134
00543   376*      C                                                                         001134
00543   377*      C  ***  CHECKING THE END OF FILE MARK  ***                               001134
00543   378*      C                                                                         001134
00544   379*                                                                                001143
00546   380*                                                                                001146
00547   381*                                                                                001151
00550   382*                                                                                001154
00550   383*      C                                                                         001154
00550   384*      C  ***  STORE DATA IN THE WORK - ARRAY  ***                             001154
00550   385*      C                                                                         001154
00551   386*                                                                                001165
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00554    387*        31 WORK(KOUNT,I) = RECORD(I)                                                    001165
00554    388*     C                                                                                  001165
00554    389*     C  ***  CHECKING AGAINST THE TOTAL NUMBER OF RECORDS AND THE NUMBER ***           001165
00554    390*     C  ***  OF RECORDS STORED IN THE WORKING ARRAY  ***                                001165
00554    391*     C                                                                                  001165
00556    392*           IF(ISTREC .LT. ITOTAL) GO TO 415                                            001167
00560    393*           IF(KOUNT .GT. 1) GO TO 420                                                  001173
00562    394*           GO TO 5                                                                     001177
00563    395*        415 IF(KOUNT .LT. NWORK) GO TO 749                                             001201
00563    396*     C                                                                                  001201
00563    397*     C  ***  IN  PROGATE THE FUNCTION TABLE FOR NUMBER OF CHANNEL  ***                  001201
00563    398*     C                                                                                  001201
00565    399*        420 DO 380 ICNT = 1,NC                                                         001205
00565    400*     C                                                                                  001205
00565    401*     C  ***  THE FLAG ( ICALL ) IS SET FOR TESTING IF THIS CHANNEL IS  ***              001205
00565    402*     C  ***  BEING APPLIED BY ANOTHER FUNCTION  ***                                     001205
00565    403*     C                                                                                  001205
00570    404*           ICALL = 0                                                                   001214
00571    405*           I = ICNT                                                                    001215
00572    406*           ICHAN = IFCNTB(I,1)                                                         001221
00572    407*     C                                                                                  001221
00573    408*               DO 310 J=2,8                                                            001226
00576    409*               IF(IFCNTB(I,J) .LE. 0) GO TO 310                                        001226
00600    410*               ITYPE = IFCNTB(I,J)                                                     001230
00601    411*               GO TO (320,321,310,310,310,311,310),ITYPE                               001232
00601    412*     C                                                                                  001232
00601    413*     C  ***  SEARCH FOR THE INPUT OF SKEW FUNCTION  ***                                001232
00601    414*     C                                                                                  001232
00602    415*        320 IDTSKW = INSKEW(I)                                                         001247
00603    416*           IF(IDTSKW .LT. IDT  .AND.  IDTSKW .GT. NEGIDT) GO TO 334                    001250
00605    417*           IDTSAB = IABS(IDTSKW)                                                       001265
00606    418*           NLOCAL = IDTSAB/IDT + 1                                                     001267
00607    419*           IF(MOD(IDTSAB,IDT) .GT. 0) NLOCAL = NLOCAL + 1                              001273
00611    420*           IF(IDTSKW .LT. 0) GO TO 330                                                 001303
00613    421*        331 IFIRST = NCAP - NLOCAL + 1                                                 001307
00613    422*     C                                                                                  001307
00613    423*     C  ***  APPLY FUNCTION AS DICTATED IN IFCNTB  ***                                  001307
00613    424*     C                                                                                  001307
00614    425*        332 CALL SKEW(IDT,ICHAN,NWORD,ICNT,IFIRST,IRFOUT,IDTSAB,ICALL)                 001313
00615    426*           NN = NWORD + ICNT                                                           001324
00616    427*           GO TO 310                                                                   001327
00616    428*     C                                                                                  001327
00617    429*        330 IFIRST = NCAP + NLOCAL - 2                                                 001331
00620    430*           GO TO 332                                                                   001334
00620    431*     C                                                                                  001334
00621    432*        334 IDTSAB = IABS(IDTSKW)                                                      001336
00622    433*           NLOCAL = 1                                                                  001337
00623    434*           IF(IDTSKW .GT. 0) GO TO 330                                                 001341
00625    435*           GO TO 331                                                                   001344
00625    436*     C                                                                                  001344
00625    437*     C  ***  CALL ROUTINE NOISE  ***                                                   001344
00625    438*     C                                                                                  001344
00626    439*        321 CALL NOISE(ICHAN,NUMFRE,STANDN,NTYPE,IDT,ICNT,NWORD,IBUF,                  001346
00626    440*       *                NRANDM,ICALL,IRFOUT)                                          001346
00627    441*           GO TO 310                                                                   001362
00627    442*     C                                                                                  001362
00627    443*     C  ***  CALL ROUTINE QUANTATIZATION  ***                                          001362
00627    444*     C                                                                                  001362
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00630    445*      311 CALL QUANTN(IBIT,QMAX,QMIN,ICNT,NWORD,ICALL,ICHAN,IRFOUT)                001364
00630    446*    C                                                                             001364
00631    447*      310     CONTINUE                                                            001401
00631    448*    C                                                                             001401
00633    449*      300 CONTINUE                                                                001401
00633    450*    C                                                                             001401
00633    451*    C  ***  WRITE ON THE OUTPUT FILE OR TAPE  ***                                 001401
00633    452*    C                                                                             001401
00635    453*          WRITE(6,6555) NMOTRC                                                    001401
00640    454*     6555 FORMAT(/20X,'OUTPUT RECORD NUMBER = ',I4/)                              001412
00641    455*          WRITE(6,6677) (WORK(IRFOUT,INN),INN=1,ISUM)                             001412
00647    456*     6677 FORMAT(2X,8F16.5)                                                       001425
00647    457*    C                                                                             001425
00650    458*          WRITE(JUNT) (WORK(IRFOUT,KK),KK=1,ISUM)                                 001425
00656    459*          IBUF = 1                                                                001437
00657    460*          NMOTRC = NMOTRC + 1                                                     001441
00660    461*          IF(SKWFLG) GO TO 777                                                    001443
00660    462*    C                                                                             001443
00660    463*    C  ***  SKEW FLAG HAS NOT BEEN TURNED ON AT ALL  ***                         001443
00660    464*    C                                                                             001443
00662    465*          CALL CONVER(IUNT,NWORD,ITM,IDT,RECORD,IK)                               001445
00663    466*          IF(ITM .GT. IET) GO TO 5                                                001455
00665    467*          IF(IK .EQ. 1) GO TO 1010                                                001461
00667    468*          ISTREC = ISTREC + 1                                                     001466
00667    469*    C                                                                             001466
00670    470*          DO 15 I=1,NWORD                                                         001475
00673    471*       15 WORK(1,I) = RECORD(I)                                                   001475
00673    472*    C                                                                             001475
00675    473*          IF(ISTREC .GT. ITOTAL) GO TO 5                                          001477
00677    474*          GO TO 420                                                               001503
00677    475*    C                                                                             001503
00677    476*    C  ***  INITIALIZE TO REPOSITION THE WORK - ARRAY  ***                       001503
00677    477*    C                                                                             001503
00700    478*      777 NMOVE = 1                                                               001505
00701    479*          NSTOP = NWORK - 1                                                       001506
00701    480*    C                                                                             001506
00701    481*    C  ***  REPOSITION THE WORK - ARRAY  ***                                     001506
00701    482*    C                                                                             001506
00702    483*          DO 99 K=1,NSTOP                                                         001520
00705    484*          NMOVE = NMOVE + 1                                                       001527
00706    485*             DO 98 J=1,NWORD                                                      001531
00711    486*             WORK(K,J) = WORK(NMOVE,J)                                            001536
00712    487*       98    CONTINUE                                                            001544
00714    488*       99 CONTINUE                                                               001544
00714    489*    C                                                                             001544
00714    490*    C  ***  BRING IN MORE DATA FROM INPUT FILE  ***                              001544
00714    491*    C                                                                             001544
00716    492*          CALL CONVER(IUNT,NWORD,ITM,IDT,RECORD,IK)                               001544
00717    493*          IF(ITM .GE. IET) GO TO 5                                                001554
00721    494*          IF(IK .EQ. 1) GO TO 1010                                                001560
00723    495*          ISTREC = ISTREC + 1                                                     001565
00723    496*    C                                                                             001565
00723    497*    C  ***  AND THEN STORE DATA IN THE WORK - ARRAY  ***                         001565
00723    498*    C                                                                             001565
00724    499*          DO 82 I=1,NWORD                                                         001575
00727    500*       82  WORK(NWORK,I) = RECORD(I)                                            001575
00727    501*    C                                                                             001575
00731    502*          IF(ISTREC .GT. ITOTAL) GO TO 5                                          001577
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00733    503*          GO TO 420
00733    504*    C
00733    505*    C   *******  E R R O R   M E S S A G E S  ********                001603
00733    506*    C                                                                001603
00734    507*     1000 WRITE(6,660)                                               001603
00736    508*      660 FORMAT(1X,'ERROR - WE CANNOT FIND START TIME ')            001605
00737    509*          GO TO 5                                                     001611
00740    510*     1010 WRITE(6,665)                                               001611
00742    511*      665 FORMAT(1X,'ERROR   END OF FILE ENCOUNTERED ')              001613
00743    512*          GO TO 5                                                     001617
00744    513*      501 WRITE(6,670)                                               001617
00746    514*      670 FORMAT(1X,'ERROR ON READING INPUT FILE ')                  001621
00747    515*          GO TO 5                                                     001625
00750    516*        1 WRITE(6,672) IFUNC                                         001625
00753    517*      672 FORMAT(1X,'WE DO NOT HAVE THE INFORMATION FOR THIS FUNCTION',I5)  001627
00754    518*          GO TO 1051                                                  001634
00755    519*       43 WRITE(6,619)                                               001634
00757    520*      619 FORMAT(1X,'ERROR - TRY AGAIN',/                           001636
00757    521*         *,1X,'YOU HAVE INPUT A NON-EXISTING START TIME')           001642
00760    522*          GO TO 100                                                   001642
00761    523*     1055 WRITE(6,621)                                               001642
00763    524*      621 FORMAT(1X,'YOU ARE NOT ALLOWED TO INPUT THE SAME FUNCTION NUMBER A  001644
00763    525*         *T THE SAME CHANNEL IN ONE PROCESS')                       001650
00764    526*          GO TO 1051                                                  001650
00765    527*       49 WRITE(6,6222)                                              001650
00767    528*     6222 FORMAT(1X,'NUMBER OF BITS HAS TO BE GREATER THAN 0')       001652
00770    529*          GO TO 9                                                     001656
00771    530*       79 WRITE(6,6233)                                              001656
00773    531*     6233 FORMAT(1X,'YOU HAVE INPUT THE INVALID VALUES FOR MAX.'/    001660
00773    532*         *,1X,'NUMBER AND MIN. NUMBER OF QUANTATIZATION')           001664
00774    533*          GO TO 27                                                    001664
00775    534*      196 WRITE(6,6991)                                              001664
00777    535*     6991 FORMAT(1X,'YOU HAVE INPUT AN INVALID NUMBER FOR INPUT UNIT')  001666
01000    536*          GO TO 199                                                   001672
01001    537*      197 WRITE(6,6993)                                              001672
01003    538*     6993 FORMAT(1X,'YOU HAVE INPUT AN INVALID NUMBER FOR OUTPUT UNIT')  001674
01004    539*          GO TO 199                                                   001700
01005    540*      201 WRITE(6,608)                                               001700
01007    541*      608 FORMAT(1X,'YOU HAVE INPUT AN UNACCEPTABLE POSITIVE SKEW TIME'/  001702
01007    542*         *1X,'IT HAS TO BE LESS THAN FIVE POSITIVE SAMPLE RATES')    001706
01010    543*          GO TO 1050                                                  001706
01011    544*      202 WRITE(6,609)                                               001706
01013    545*      609 FORMAT(1X,'YOU HAVE INPUT AN UNACCEPTABLE NEGATIVE SKEW TIME'/  001710
01013    546*         *1X,'IT HAS TO BE GREATER THAN FIVE NEGATIVE SAMPLE RATES')  001714
01014    547*          GO TO 1050                                                  001714
01015    548*      745 WRITE(6,6115)                                              001714
01017    549*     6115 FORMAT(1X,'ERROR - TRY AGAIN',/                           001716
01017    550*         *,1X,'YOU HAVE INPUT AN INVALID NUMBER OF FREQUENCY')      001722
01020    551*          GO TO 2                                                     001722
01021    552*          END                                                         001722
END FOR                                                                          001725
)
```

```
@FOR,S DAPSPT.NOISE/LEC
FOR S0E3-06/13/79-12:55:29 (0,)

   SUBROUTINE NOISE     ENTRY POINT 000140

   STORAGE USED: CODE(1) 000162; DATA(0) 000025; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   ARRAY  004230
    0004   HERTZ  000764
    0005   DISTC  000764
    0006   DEGRE  000764
    0007   TIMEX  000144

   EXTERNAL REFERENCES (BLOCK, NAME)

    0010   ZOR
    0011   SIN
    0012   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000056 126G      0001   000041 135L      0001   000107 155L      0001   000111 160L      0001   000047 200L
    0001   000051 205L      0005 R 000000 AMPL      0000 R 000003 COMPUT    0004 R 000000 FREQ      0000   000005 INJP$
    0000 I 000002 J         0000 I 000000 NMFREQ    0006 R 000000 PHASE     0007 R 000000 TLOCAL    0003 R 000000 WORK
    0000 R 000001 Y         0010 R 000000 ZOR


00100     1*     C                                                                                    000032
00100     2*     C                                                                                    000032
00100     3*     C       SUBROUTINE NAME  -  NOISE                                                    000032
00100     4*     C                                                                                    000032
00100     5*     C           AUTHOR       :      M.T. NGUYEN                                          000032
00100     6*     C           DATE         :      DECEMBER  1978                                       000032
00100     7*     C                                                                                    000032
00100     8*     C       FOR EX43 - ENGINEERING ANALYSIS DIVISION AT NASA/JSC                         000032
00100     9*     C                                                                                    000032
00100    10*     C       PURPOSE :                                                                    000032
00100    11*     C                                                                                    000032
00100    12*     C           THIS FUNCTION IS USED TO CHANGE A MEASUREMENT BY MEANS OF                000032
00100    13*     C           FREQUENCY, AMPLITUDE, PHASE ANGLE OR RANDOM NUMBER                       000032
00100    14*     C                                                                                    000032
00100    15*     C                                                                                    000032
00101    16*           SUBROUTINE NOISE(ICHAN,NUMFRE,STANDN,NTYPE,IDT,ICNT,NWORD,                     000032
00101    17*          *                IBUF,NRANDM,ICALL,IRFOUT)                                     000032
00103    18*           PARAMETER IDTMIN=20,IDTSMA=5*IDTMIN                                            000032
00104    19*           PARAMETER NWORK1=2*IDTSMA/IDTMIN+1                                             000032
00105    20*           COMMON /ARRAY/ WORK(NWORK1,200)                                                000032
00106    21*           COMMON /HERTZ/ FREQ(100,5)                                                     000032
00107    22*           COMMON /DISTC/ AMPL(100,5)                                                     000032
00110    23*           COMMON /DEGRE/ PHASE(100,5)                                                    000032
```

```
00111     24*           COMMON /TIMEX/ TLOCAL(100)                                                  000032
00112     25*           DIMENSION NTYPE(100),STANDN(100),NRANDM(100),NUMFRE(100)                    000032
00113     26*           NMFREQ = NUMFRE(ICNT)                                                       000032
00113     27*     C                                                                                 000032
00113     28*     C  ***  TEST TO SEE IF THIS IS THE FIRST COMPUTED INPUT DATA RECORD  ***         000032
00113     29*     C                                                                                 000032
00114     30*           IF(IBUF) 130,130,135                                                        000034
00114     31*     C                                                                                 000034
00114     32*     C  ***  INITIALIZE TIME OF NOISE  ***                                           000034
00114     33*     C                                                                                 000034
00117     34*       130 TLOCAL(ICNT) = 0.                                                           000037
00117     35*     C                                                                                 000037
00117     36*     C  ***  ADD NOISE ON THE WORKED MEASUREMENT  ***                                  000037
00117     37*     C                                                                                 000037
00117     38*     C    ICALL - FLAG TO DETERMINE WHETHER THE PRESENT INPUT MEASUREMENT             000037
00117     39*     C            HAS BEEN APPLIED BY ANOTHER FUNCTION                                 000037
00117     40*     C                                                                                 000037
00120     41*       135 IF(ICALL .LE. 0) GO TO 200                                                  000041
00122     42*           Y = WORK(IRFOUT,NWORD+ICNT)                                                 000043
00123     43*           GO TO 205                                                                   000045
00123     44*     C                                                                                 000045
00124     45*       200 Y = WORK(IRFOUT,ICHAN)                                                      000047
00125     46*       205 DO 10 J = 1,NMFREQ                                                          000051
00130     47*           Y = Y + AMPL(ICNT,J)*SIN(FREQ(ICNT,J)                                       000056
00130     48*          1  *TLOCAL(ICNT)+PHASE(ICNT,J))                                              000056
00131     49*        10  CONTINUE                                                                  000070
00131     50*     C                                                                                 000070
00131     51*     C  ***  ARE WE ADDING RANDOM NOISE ON THAT MEASUREMENT  ***                      000070
00131     52*     C                                                                                 000070
00133     53*           IF(NRANDM(ICNT) .LE. 0) GO TO 155                                           000070
00136     54*           COMPUT = ZOR(NTYPE(ICNT))                                                   000073
00136     55*           Y = Y + STANDN(ICNT) * COMPUT                                               000101
00137     56*           WORK(IRFOUT,NWORD+ICNT) = Y                                                 000104
00140     57*           GO TO 160                                                                   000105
00140     58*     C                                                                                 000105
00140     59*     C    RANDOM NOISE WILL NOT BE ADDED TO THE MEASUREMENT IN WHICH                   000105
00140     60*     C    THE RANDOM NUMBER IS EQUAL ZERO                                              000105
00140     61*     C                                                                                 000105
00141     62*       155 WORK(IRFOUT,NWORD+ICNT) = Y                                                 000107
00141     63*     C                                                                                 000107
00141     64*     C    INCREMENT TIME WHEN NEXT DATA RECORD BROUGHT IN                              000107
00141     65*     C                                                                                 000107
00142     66*       160 TLOCAL(ICNT) = TLOCAL(ICNT)+ FLOAT(IDT)                                     000111
00143     67*         5 CONTINUE                                                                    000115
00144     68*           ICALL = 1                                                                   000115
00145     69*           RETURN                                                                      000117
00146     70*           END                                                                         000161
END FOR
>
```

```
@FOR,S DAPSPT.SKEW/LEC
FOR $0E3-06/13/79-12:57:21 (0,)

   SUBROUTINE SKEW      ENTRY POINT 000117

   STORAGE USED: CODE(1) 000132; DATA(0) 000025; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   ARRAY  004230

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000005 DELT      0000 R 000004 DTMTO     0000 R 000003 DT1MT     0000 I 000002 IDTMTO    0000 I 000001 IDT1MT
    0000   000012 INJP$     0000 I 000000 ITIME     0003 R 000000 WORK      0000 R 000006 Y
```

```
00100      1$      C                                                                                    000014
00100      2$      C                                                                                    000014
00100      3$      C     SUBROUTINE NAME   -   SKEW                                                     000014
00100      4$      C                                                                                    000014
00100      5$      C        AUTHOR     :    M.T. NGUYEN                                                000014
00100      6$      C        DATE       :    NOVEMBER  1978                                             000014
00100      7$      C                                                                                    000014
00100      8$      C                                                                                    000014
00100      9$      C     FOR EX43 - ENGINEERING ANALYSIS DIVISION AT NASA/JSC                           000014
00100     10$      C                                                                                    000014
00100     11$      C                                                                                    000014
00100     12$      C     PURPOSE :                                                                      000014
00100     13$      C                                                                                    000014
00100     14$      C        THIS FUNCTION IS USED TO INTRODUCE A TIME-SHIFT, EITHER IN A                000014
00100     15$      C        POSITIVE (RIGHT) DIRECTION OR NEGATIVE (LEFT) DIRECTION, FOR                000014
00100     16$      C        A GIVEN MEASUREMENT, WITH RESPECT TO A NORMAL (UNSKEWED)                    000014
00100     17$      C        MEASUREMENT                                                                 000014
00100     18$      C                                                                                    000014
00100     19$      C                                                                                    000014
00101     20$              SUBROUTINE SKEW(IDT,ICHAN,NWORD,ICNT,IFIRST,IRFOUT,IDTSAB,ICALL)            000014
00103     21$              PARAMETER IDTMIN=20,IDTSMA=5*IDTMIN                                         000014
00104     22$              PARAMETER NWORK1=2*IDTSMA/IDTMIN+1                                          000014
00105     23$              COMMON /ARRAY/ WORK(NWORK1,200)                                             000014
00105     24$      C                                                                                    000014
00106     25$              ITIME = IFIX(WORK(IRFOUT,1)*1000.+.05) - IDTSAB                             000014
00107     26$              IDT1MT = IFIX(WORK(IFIRST+1,1)*1000.+.05)                                   000027
00110     27$              IDTMTO = IFIX(WORK(IFIRST,1)*1000.+.05)                                     000041
00111     28$              DT1MT = FLOAT(IDT1MT - ITIME)                                               000053
00112     29$              DTMTO = FLOAT(ITIME - IDTMTO)                                               000057
00113     30$              DELT = FLOAT(IDT)                                                           000063
00113     31$      C                                                                                    000063
```

```
[illegible]    32*      C   *** PERFORM A LINEAR INTERPOLATION ***                                    000063
[illegible]    33*      C                                                                             000063
[illegible]    34*           Y = 1./DELT*(WORK(IFIRST,ICHAN)*DTIMT+WORK(IFIRST+1,ICHAN)*DTMTO)        000066
[illegible]    35*           WORK(IRFOUT,NWORD+ICMT) = Y                                              000077
[illegible]    36*           ICALL = 1                                                                000100
[illegible]    37*            RETURN                                                                  000102
[illegible]    38*           END                                                                      000131
END FOR
>
```

```
@FOR,$ DAPSPT.QUAMTM/LEC
FOR S0E3-06/13/79-12:58:38 (0,

   SUBROUTINE QUANTM    ENTRY P INT 00013

   STORAGE USED: CODE(1) 000143; DATA(0) 000017; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   ARRAY  004230

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   XPII
    0005   MERR38

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000111 100L      0001   000104 105L      0001   000107 110L      0001   000032 200L      0001   000034 205L
    0000 R 000001 BITS      0000 R 000002 DELTA     0000 I 000003 INCR      0000   000006 INJP$     0003 R 000000 WORK
    0000 R 000000 Y
```

```
00100      1*      C                                                                    000023
00100      2*      C                                                                    000023
00100      3*      C        SUBROUTINE NAME      *      QUAMTM                          000023
00100      4*      C                                                                    000023
00100      5*      C          AUTHOR      :     M.T. NGUYEN                           000023
00100      6*      C          DATE        :     DECEMBER  1978                        000023
00100      7*      C                                                                    000023
00100      8*      C                                                                    000023
00100      9*      C        FOR EX43 - ENGINEERING ANALYSIS DIVISION AT NASA/JSC        000023
00100     10*      C                                                                    000023
00100     11*      C                                                                    000023
00100     12*      C        PURPOSE :                                                   000023
00100     13*      C                                                                    000023
00100     14*      C           THIS FUNCTION IS USED TO CHANGE A MEASUREMENT FROM A     000023
00100     15*      C           CONTINUOS FORM TO ONE WITH DISCRETE STEPS TO SIMULATE    000023
00100     16*      C           DIGITAL DATA .                                           000023
00100     17*      C                                                                    000023
00100     18*      C                                                                    000023
00101     19*            SUBROUTINE QUANTM(IBIT,QMAX,QMIN,ICNT,NWORD,ICALL,ICHAN,IRFOUT)  000023
00103     20*            PARAMETER IDTMIN=20,IDTSMA=5*IDTMIN                              000023
00104     21*            PARAMETER NWORK1=2*IDTSMA/IDTMIN+1                               000023
00105     22*            COMMON /ARRAY/ WORK(NWORK1,200)                                  000023
00106     23*            DIMENSION IBIT(100),QMAX(100),QMIN(100)                          000023
00106     24*      C                                                                      000023
00106     25*      C     ICALL - FLAG TO DETERMINE WHETHER THE PRESENT INPUT CHANNEL HAS  000023
00106     26*      C             BEEN APPLIED BY ANOTHER FUNCTION                         000023
00106     27*      C                                                                      000023
00107     28*            IF(ICALL .LE. 0) GO TO 200                                       000023
00111     29*            Y = WORK(IRFOUT,NWORD+ICNT)                                      000026
```

```
00114     30*          GO TO 205                                                                  000030
00113     31*        200 Y = WORK(IRFOUT,ICHAN)                                                   000032
00114     32*        205 IF(Y .LT. QMIN(ICNT)) GO TO 105                                          000034
00116     33*            IF(Y .GE. QMAX(ICNT)) GO TO 110                                          000037
00120     34*            BITS = FLOAT(2**IBIT(ICNT))                                              000043
00120     35*      C                                                                              000043
00120     36*      C   DELTA - NUMBER OF STEPS INTO WHICH MEASUREMENT RANGE IS DIVIDED            000043
00120     37*      C                                                                              000043
00120     38*      C   INCR  -  NUMBER OF INCREMENTS OF SIZE DELTA INTO WHICH A                   000043
00120     39*      C              MEASUREMENT VALUE WILL BE DIVIDED                               000043
00120     40*      C                                                                              000043
00121     41*            DELTA = (QMAX(ICNT) - QMIN(ICNT))/BITS                                   000054
00122     42*            INCR = INT((Y - (QMIN(ICNT) + DELTA/2.))/DELTA)                          000060
00123     43*            Y = QMIN(ICNT) + FLOAT(INCR + 1) * DELTA                                 000073
00124     44*            GO TO 100                                                                000102
00124     45*      C                                                                              000102
00125     46*        105 Y = QMIN(ICNT)                                                           000104
00126     47*            GO TO 100                                                                000105
00127     48*        110 Y = QMAX(ICNT)                                                           000107
00130     49*        100 WORK(IRFOUT,NWORD+ICNT) = Y                                              000111
00131     50*          5 CONTINUE                                                                 000112
00132     51*            ICALL = 1                                                                000112
00133     52*            RETURN                                                                   000114
00134     53*            END                                                                      000142
END FOR
>
```

```
@FOR,S DAPSPT.CONVER
FOR S0E3-06/13/79-13:00:04 (1,)

   SUBROUTINE CONVER    ENTRY POINT 000074

   STORAGE USED: CODE(1) 000124; DATA(0) 000050; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   SSRD
    0004   NWDU$
    0005   NIO2$
    0006   MERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000064 10L       0000   000004 110F      0000   000022 115F      0001   000042 50L       0001   000052 55L
    0000 I 000003 IFST      0000 I 000002 ILST      0000   000043 INJP$     0000 I 000000 NK        0000 R 000001 P


00101      1*          SUBROUTINE CONVER(IUNT,NWORD,ITM,IDT,RECORD,IK)                                  000000
00101      2*     C....THIS SUBROUTIINE READS A SSFS TYPE CALCOMP                                       000000
00101      3*     C      FILE AND RETURNS TIME, DELTA TME, AND                                         000000
00101      4*     C       A DATA RECORD                                                                000000
00103      5*          DIMENSION RECORD(150)                                                           000000
00104      6*        110 FORMAT(//,1X,'EOF ENCOUNTERED READING UNIT ',I4,                              000000
00104      7*           1' IN DAP.FACCES AFTER TIME=',I10,)                                           000000
00105      8*        115 FORMAT(//,1X,'PARITY ERROR ON READING UNIT ',I4,                              000000
00105      9*           1' IN DAP.FACCES AFTER TIME=',I10,)                                           000000
00106     10*           NK = 1                                                                        000000
00107     11*           CALL SSRD(IUNT,NK,NWORD,P,IK,RECORD)                                          000000
00110     12*           IF( IK .EQ. 1 ) GO TO 55                                                      000002
00112     13*           IF( IK .GT. 1 ) GO TO 50                                                      000012
00114     14*           ITM=IFIX( RECORD(1)*1000. + .05 )                                             000015
00115     15*           ILST = IFST                                                                   000021
00116     16*           IFST = ITM                                                                    000033
00117     17*           IDT = IFST - ILST                                                             000035
00120     18*           GO TO 10                                                                      000036
00121     19*        50 WRITE (6,115) IUNT,ITM                                                        000040
00125     20*           GO TO 10                                                                      000042
00126     21*        55 WRITE(6,110)IUNT, ITM                                                         000050
00132     22*           ITM=ITM+IDT                                                                   000052
00133     23*        10 RETURN                                                                        000060
00134     24*           END                                                                           000064
END FOR                                                                                             000123
>
```

```
@FOR,S DAPSPT.SSRD
FOR S0E3-06/13/79-17:00:54 (0,)

   SUBROUTINE SSRD      ENTRY POINT 000054

   STORAGE USED: CODE(1) 000067; DATA(0) 000017; BLANK COMMON(2) 00000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NRBU$
    0004   NIO1$
    0005   NIO2$
    0006   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000024 114G      0001   000036 180L      0001   000042 190L      0000 I 000004 I          0000 I 000001 IKP
    0000 I 000002 IKPT      0000   000006 INJP$     0000 I 000003 LTH       0000 R 000000 XBUFF


00101      1%            SUBROUTINE SSRD(IUNT,NW,MW,IP,IK,BUFF)                                    000007
00101      2%      C                                                                               000007
00101      3%      C   IUNT=UNIT NUMBER                                                           000007
00101      4%      C   NW=BEGINING BUFFER INDEX                                                   000007
00101      5%      C   MW=ENDING BUFFER INDEX                                                      000007
00101      6%      C   IP=PARITY INDICATOR                                                         000007
00101      7%      C   IK= 0, READ OK                                                              000007
00101      8%      C       1, EOF ENCOUNTERED                                                      000007
00101      9%      C       2, PARITY ERROR                                                         000007
00101     10%      C                                                                               000007
00103     11%           DIMENSION BUFF(1)                                                          000007
00104     12%           DATA XBUFF /3HEOF /                                                        000007
00106     13%           IKP=0                                                                      000007
00107     14%           IKPT=0                                                                     000010
00110     15%       100 CONTINUE                                                                   000011
00111     16%           LTH=MW-NW+1                                                                000011
00112     17%           READ(IUNT) (BUFF(I),I=NW,MW)                                               000015
00120     18%           IF( BUFF(1) -XBUFF ) 180,170,180                                           000027
00123     19%       170 IK=1                                                                       000032
00124     20%           GO TO 190                                                                  000034
00125     21%       180 IF( IK .NE. 2 ) IK=0                                                       000036
00127     22%       190 RETURN                                                                     000042
00130     23%           END                                                                        000066
END FOR
>
```

```
@PRT,S DAPSPT.MAPNOISE
FURPUR 87R3A       E33 SL73R1 06/13/79 13:02:23



EX32-L72330*DAPSPT(1).MAPNOISE
     1        LIB EX32-L72330*DAPSPT.
     2        LIB MSC*LOCALIB.
     3          IN NOISNG,SKEW,NOISE,CONVER,SSRD,QUANTN
     4          NOT NOISNG/TEST,NOISE/TEST,SKEW/TEST
     5          NOT QUANTN/TEST
     6         END
>
```

APPENDIX B

A TEST CASE

```
@<GT ILLIN RUN
 PLEASE ENTER THE INPUT & OUTPUT LOGICAL UNITS
>8,9
 THE NUMBER OF MEASUREMENTS IN EACH DATA RECORD ARE   35
 PLEASE ENTER START AND END TIME IN MILISECOND INTEGER
>3181020,3181560
 PLEASE ENTER CHANNEL NUMBER
>2

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>1
 PLEASE ENTER SKEW TIME IN MILLISECOND INTEGER
>70
 CURRENT MAXIMUM VALUE OF IDTS IS   70


 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>6
 PLEASE ENTER NUMBER OF BITS
>4
 PLEASE ENTER THE UPPER & LOWER LIMITS OF RANGE
 FOR WHICH THIS CHANNEL IS TO BE QUANTATIZED
>4 051.1.870

          NUMBER OF BITS  4     MAX  NUMBER        4 05100     MIN  NUMBER        1 87000

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>0
 PLEASE ENTER CHANNEL NUMBER
>0

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>1
 PLEASE ENTER SKEW TIME IN MILLISECOND INTEGER
>90
 CURRENT MAXIMUM VALUE OF IDTS IS   90


 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE
```

```
>0
 PLEASE ENTER CHANNEL NUMBER
>15

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>2
 PLEASE ENTER NUMBER OF FREQUENCIES
>3
 PLEASE ENTER VALUES OF FREQUENCY IN HERTZ
                        AMPLITUDE
                        PHASE IN DEGREE

>3.45. 030.30
>4.56. 040.40.
>5.67. 050.50
     FREQUENCY        21.67699     AMPLITUDE          03000     PHASE          52360
     FREQUENCY        28.65132     AMPLITUDE          04000     PHASE          69813
     FREQUENCY        35.62566     AMPLITUDE          05000     PHASE          87266
 PLEASE ENTER THE VALUES REPRESENTING THE VARIABLES AS
          RANDOM NUMBER WHERE IT IS 5-7 DIGIT INTEGER. LAST DIGIT IS ODD
          TYPE OF RANDOM WHERE 0 IS UNIFORM AND 1 IS NORMAL
          AMPLITUDE OF STANDARD DEVIATION
>42335.1..020

 RANDOM NUMBER   42335  TYPE 1  STNDRD DEV      02000


 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>0
 PLEASE ENTER CHANNEL NUMBER
>24

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>6
 PLEASE ENTER NUMBER OF BITS
>8
 PLEASE ENTER THE UPPER & LOWER LIMITS OF RANGE
 FOR WHICH THIS CHANNEL IS TO BE QUANTATIZED
>1.005. 00230
          NUMBER OF BITS  8     MAX. NUMBER        1.00500     MIN. NUMBER          00230


 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE
```

```
PLEASE ENTER CHANNEL NUMBER
>3

PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
        1-SKEW          2-NOISE
        3-LOCATION      4-BIAS
        5-ALIGN         6-QUANT
                7-SAMPLE RATE

>1
PLEASE ENTER SKEW TIME IN MILLISECOND INTEGER
>-75
CURRENT MINIMUM VALUE OF IDTS IS  -75

CURRENT MAXIMUM VALUE OF IDTS IS   90

PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
        1-SKEW          2-NOISE
        3-LOCATION      4-BIAS
        5-ALIGN         6-QUANT
                7-SAMPLE RATE

>2
PLEASE ENTER NUMBER OF FREQUENCIES
>5
PLEASE ENTER VALUES OF FREQUENCY IN HERTZ
                        AMPLITUDE
                        PHASE IN DEGREE
>1.00,.010,10
>2.00,.020,20
>3.00,.030,30
>4.00,.040,40
>5.00,.050,50
    FREQUENCY       6 28319     AMPLITUDE       01000     PHASE       17453
    FREQUENCY      12 56637     AMPLITUDE       02000     PHASE       34907
    FREQUENCY      18 84956     AMPLITUDE       03000     PHASE       52360
    FREQUENCY      25 13274     AMPLITUDE       04000     PHASE       69813
    FREQUENCY      31 41593     AMPLITUDE       05000     PHASE       87266
PLEASE ENTER THE VALUES REPRESENTING THE VARIABLES AS
        RANDOM NUMBER WHERE IT IS 5-7 DIGIT INTEGER, LAST DIGIT IS ODD
        TYPE OF RANDOM WHERE 0 IS UNIFORM AND 1 IS NORMAL
        AMPLITUDE OF STANDARD DEVIATION
>51237,0,.035

RANDOM NUMBER   51237  TYPE 0  STNDRD DEV      03500

PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
        1-SKEW          2-NOISE
        3-LOCATION      4-BIAS
        5-ALIGN         6-QUANT
                7-SAMPLE RATE

>6
PLEASE ENTER NUMBER OF BITS
>12
PLEASE ENTER THE UPPER & LOWER LIMITS OF RANGE
FOR WHICH THIS CHANNEL IS TO BE QUANTATIZED
>4 03591,1 06433

        NUMBER OF BITS 12     MAX. NUMBER       4 03591     MIN. NUMBER       1 06433
```

```
 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>3
 PLEASE ENTER CHANNEL NUMBER
>5

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>1
 PLEASE ENTER SKEW TIME IN MILLISECOND INTEGER
>15
 CURRENT MAXIMUM VALUE OF IDTS IS   90

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>2
 PLEASE ENTER NUMBER OF FREQUENCIES
>2
 PLEASE ENTER VALUES OF FREQUENCY IN HERTZ
                     AMPLITUDE
                     PHASE IN DEGREE
>5.074. 070.70.
>3.254. 060.50
    FREQUENCY       31 88888     AMPLITUDE          07000     PHASE        1 22173
    FREQUENCY       20.44E48     AMPLITUDE          05000     PHASE          87286
 PLEASE ENTER THE VALUES REPRESENTING THE VARIABLES AS
          RANDOM NUMBER WHERE IT IS 5-7 DIGIT INTEGER. LAST DIGIT IS ODD
          TYPE OF RANDOM WHERE 0 IS UNIFORM AND 1 IS NORMAL
          AMPLITUDE OF STANDARD DEVIATION
>0.0. 030

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>0
 PLEASE ENTER CHANNEL NUMBER
>20

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW          2-NOISE
          3-LOCATION      4-BIAS
          5-ALIGN         6-QUANT
                  7-SAMPLE RATE

>2
 PLEASE ENTER NUMBER OF FREQUENCIES
>4
```

```
 PLEASE ENTER VALUES OF FREQUENCY IN HERTZ
                        AMPLITUDE
                        PHASE IN DEGREE
>1 05  050 50
>2 05  040.40
>1 05  020.30
>5 05  020.20
     FREQUENCY        19 16372      AMPLITUDE          05000      PHASE          87266
     FREQUENCY        12 88053      AMPLITUDE          04000      PHASE          69813
     FREQUENCY         6 59734      AMPLITUDE          03000      PHASE          52360
     FREQUENCY        31 73000      AMPLITUDE          02000      PHASE          34907
 PLEASE ENTER THE VALUES REPRESENTING THE VARIABLES AS
          RANDOM NUMBER WHERE IT IS 5-7 DIGIT INTEGER, LAST DIGIT IS ODD
          TYPE OF RANDOM WHERE 0 IS UNIFORM AND 1 IS NORMAL
          AMPLITUDE OF STANDARD DEVIATION
>23651.0. 055

 RANDOM NUMBER   23651  TYPE 0  STNDRD DEV      05500

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW           2-NOISE
          3-LOCATION       4-BIAS
          5-ALIGN          6-QUANT
                   7-SAMPLE RATE

>6
 PLEASE ENTER NUMBER OF BITS
>16
 PLEASE ENTER THE UPPER & LOWER LIMITS OF RANGE
 FOR WHICH THIS CHANNEL IS TO BE QUANTATIZED
> 14562.-.03492

          NUMBER OF BITS 16      MAX. NUMBER          14562      MIN. NUMBER         - 03492

 PLEASE ENTER THE NUMERICAL VALUE REPRESENTING THE FOLLOWING FUNCTIONS
          1-SKEW           2-NOISE
          3-LOCATION       4-BIAS
          5-ALIGN          6-QUANT
                   7-SAMPLE RATE

>0
 PLEASE ENTER CHANNEL NUMBER
>0

                        NUMBER OF MODIFIED CHANNELS ARE    7

                    OUTPUT RECORD NUMBER =    1

 3181 12000      2 73180       .00474       12609       3 62632       65931       - 21468       52002
  212 78867      2 00803     1 22498     -15 46766     -23 73484     2 12084     3 00397     -12 14671
    2 34013        00300       - 00685       - 71206       1 51947       03007       - 19636       - 04915
    - 63072    179 00498       - 00430         01706       - 00002     1 18059         62036       - 72000
        00000      - 00000     -1 56762       2 02419     212 29074     3 10989         00236       1 06433

                    OUTPUT RECORD NUMBER =    2

 3181 13000      2 71670       .00003       13000       3 62638       65931       - 21571       52010
  212 91043      2 01000     1 27496     -15 46857     -23 74629     2 07247     10 02890      -6 30254
    1 20301        00053       - 00467       - 00754       1 51626       02787       - 19955       - 03740
    - 54197    179 00012       - .00007         01708       - 01606     2 00594         48966       - 72000
```

30000	-.50500	-1.56618	2.88419	212.39360	10 00500	00236	1 00433
3 61311	-.03492						

OUTPUT RECORD NUMBER = 3

3181.16000	2.68682	00218	14459	3.67060	65031	-.21643	52023
213.05000	2.63864	1.27430	-15.45003	-23.75512	2 06925	10 76704	4 23989
-.85044	68252	-.51726	-.69730	1.51311	92787	-.19078	-.01785
-.54695	179.06386	-.00024	.01811	-.00492	2.23000	15101	-.70000
.31200	-.47000	-1.56618	2.68788	212.49085	19 75743	00236	1 00433
3.73500	-.03492						

OUTPUT RECORD NUMBER = 4

3181.17000	2.65423	00132	15593	3.66197	65031	-.21112	52035
213.19135	2.64603	1.27507	-15.44057	-23.76210	2 07300	9 11003	4 46007
-1.71887	68251	-.44734	-.69716	1.51133	93007	-.20412	00658
-.64701	179.69740	-.00021	.01815	-.00020	1 06409	00628	-.68000
.20000	-.45000	-1.57866	2.68788	212.61538	9 12553	00628	1 00433
3.68740	-.03492						

OUTPUT RECORD NUMBER = 5

3181.88001	2.62163	.07047	16727	3.68425	65931	-.20500	52048
213.33181	2.64852	1.27747	-15.43031	-23.76907	2 08476	-8 07870	1 26051
-8.17784	68251	-.44117	-.69714	1.50955	93447	-.21063	.01337
-.54106	179.73154	-.00019	.01815	-.03014	1.37794	00441	-.68000
.27000	-.43000	-1.59946	2.68788	212.73090	-8.13788	.01411	1 00433
3.78642	-.03492						

OUTPUT RECORD NUMBER = 6

3181.28000	2.58903	.05961	17861	3.70652	65931	-.20048	52067
213.47483	2.65253	1.27772	-15.42005	-23.77746	2 08597	-5 67228	-4 18259
-8.08644	.68251	-.40620	-.69703	1.50477	93667	-.20400	.00160
-.52385	179.78568	-.00019	.01815	-.00011	1.09002	00349	-.64000
.25000	-.41000	-1.60778	2.68788	212.84955	-5.59637	.00236	1 00433
3.63868	-.03492						

OUTPUT RECORD NUMBER = 7

3181.23000	2.66671	.07338	18145	3.74218	65931	-.19453	52096
213.68863	2.67873	1.27577	-15.40779	-23.78382	2 07843	3 26586	-10 37854
-17.03368	.68251	-.44403	-.69701	1.50617	93887	-.20462	-.01798
-.58741	179.78988	-.00018	.01815	-.00015	1.40879	00451	-.59600
.28400	-.38000	-1.60778	2.68788	212.98066	3.38276	00236	1 00433
3.71383	-.03492						

OUTPUT RECORD NUMBER = 8

3181.88001	2.63109	.08149	18145	3.78873	65931	-.17052	52126
213.77853	2.68883	1.28066	-15.38083	-23.79060	2 08845	1 37510	3 72423
-14.44853	.68250	-.38000	-.69698	1.50788	94387	-.20369	-.02057
-.51488	179.83384	-.00019	.01831	.00000	1.88453	00372	-.61000
.28400	-.37000	-1.61858	2.68788	213.12118	1.36548	.00236	1 00433
3.68840	-.03492						

OUTPUT RECORD NUMBER = 9

3181.28000	2.68647	.10000	18145	3.83128	65931	-.16861	52155
213.88883	2.68888	1.28378	-15.38827	-23.79885	2 14058	-4 12539	24 57989
-8.83678	.68250	-.38384	-.69677	1.50861	96647	-.19857	-.03349
-.54888	179.88810	-.00019	.01858	1.88540	1.58134	00374	-.43600
.30400	-.35000	-1.68868	2.86168	213.86168	-4.10000	.00236	1 00433

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 3 76378          - 03492

 OUTPUT RECORD NUMBER =   10

3181.29999     2.68184          .12772        .18145      3 87586       .65931      - 14050        .52169
 214.07597     2.78398        1.29938      -15.37001     -23.80395     2.10386      -5.60038      5.72953
    .45837         .78972        - .31777       - .69448      1 .51133        .97647      - .19827      - .87
  - .56416      179..98224        - .00019        .01881      2 .46646      1.97437         .88671      - .3
    .44480        - .33000      -1.61730       2.55156     213 .40332      -5.55967         .84236      1 .86
 3.79735          - .03492

 OUTPUT RECORD NUMBER =   11

3181.38001     2.67332          .13043        .22308      3 .86694       .65931      - .12245        .52160
 214.83046     2.76804        1.31103      -15.36876     -23.81993     2.25338      -5.58039      -26.36646
   7.79823         .85494        - .27047       - .69124      1 .51298        .98526      - .19826      - .01784
  - .55084      179.03638        - .00019        .01906      2 .33825      2.76238         .36258      - .35300
    .48000        - .36000      -1.60650       2.55156     213 .55017      -5.42448         .84236      1 .86433
 3.86244          - .03492

 OUTPUT RECORD NUMBER =   12

3181.34000     2.65881          .13042        .20868      3 .82238       .65931      - .10366        .52150
 214.38415     2.78604        1.31008      -15.35850     -23.81790     2.29517      -4.46907      -9.79758
   7.56364         .85693        - .18829       - .69098      1 .51331        .98286      - .19995      - .01010
  - .55280      179.97852        - .00019        .01915      - .13946      3.19485         .55491      - .41300
    .48000        - .36000      -1.60218       2.55788     213 .70087      -4.43217         .84236      1 .86433
 3.87898          - .03492

 OUTPUT RECORD NUMBER =   13

3181.38000     2.64431          .13042        .33738      3 .77782       .65931      - .06488        .52141
 814.59824     2.78613        1.31037      -15.34749     -23.82319     2.29665      -3.69397      22.97561
   4.81886         .84862        - .11249       - .66427      1 .51365        .99266      - .20046      - .01789
  - .53801      180.06487        - .00019        .01915      -2 .49506      2.48576         .79078      - .47300
    .48000        - .36000      -1.60218       2.55788     213 .85157      -3.10360         .84236      1 .86433
 3.88467          - .03492

 OUTPUT RECORD NUMBER =   14

3181.38000     2.62898          .13041        .39408      3 .73328       .65931      - .06618        .52144
 814.64888     2.83895        1.30811      -15.33478     -23.82453     2.33095      2.48642       28.41871
   1.71887         .80113        - .07787       - .65487      1 .51398        1.00406      - .20728      - .02527
  - .55367      180.63081        - .00019        .01915      - .00832      1.28440         .74932      - .53300
    .48000        - .18000      -1.60064       2.55788     214 .00145      2.42192         .84236      1 .86433
 3.83981          - .03492

 OUTPUT RECORD NUMBER =   15

3181.38000     2.62883          .10726        .48587      3 .72881       .65931      - .04674        .52186
 814.77888     2.98318        1.34618      -15.38891     -23.82587     2.42881      2.82188       24.76178
  -1.48838         .88033        - .07738       - .63481      1 .51304        1.00896      - .21184      - .03386
  - .55888      180.97888        - .00019        .01915      - .00211       .43411         .85888      - .58950
    .48888        - .14888      -1.61618       2.55788     214 .14881      2.88274         .84236      1 .86433
 3.74881          - .03492

 OUTPUT RECORD NUMBER =   16

3181.41888     2.65448          .21888        .44788      3 .76188       .65931      - .01851        .52188
 814.81838     2.88884        1.38884      -15.38888     -23.82788     2.65381      2.46388        .53797
  -3.88883         .88884        - .07733       - .63387      1 .48777        1.05386      - .21481      - .02888
  - .82424      180.10788        - .00019        .01823      4 .11883        .94845         .81368      - .57558
    .53888        - .11848      -1.40184       2.55788     814 .28818      2.52971         .84236      1 .86433
 3.81888          - .03492
```

OUTPUT RECORD NUMBER = 17

3181 44000	2 64888	25489	47064	3 77337	65031	01271	52210
215 64104	2 90847	1 39638	-15 89652	-23 92854	2 72084	7 39116	-11 86403
-5 50030	85668	- 66945	- 64948	1 46251	1 90545	- 21761	- 62185
- 59109	180 14133	- 90017	81975	4 12161	2 90882	- 18815	- 58560
57648	- 88540	-1 46284	2 68788	214 43619	7 42846	90236	1 86433
3 73138	- 83492						

OUTPUT RECORD NUMBER = 18

3181 46860	2 88336	29776	49332	3 79565	65031	84284	52226
215 18857	3 98693	1 41938	-15 28378	-23 82988	2 90548	6 87548	-12 49048
-8 53797	1 48881	81322	- 64387	1 43724	1 18465	- 28954	- 82163
- 58841	180 17537	- 90014	81948	2 46373	2 45778	17648	- 58558
61888	- 88540	-1 46488	2 68788	214 57861	6 86587	90236	1 86433
3 83478	- 83492						